September 2000

COMPLIANCE REPORT

COMPLIANCE TEST PROGRAM
for
PARTICULATE EMISSIONS
from
FLASH DRYER #3

Submitted For:
OMYA, INC.
61 Main Street
Proctor, Vermont 05765

Purchase Order Number: 95782

Submitted To:
AGENCY OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
AIR POLLUTION CONTROL DIVISION
103 South Main Street
Waterbury, Vermont 05671-0402

Prepared by:
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Project Number: 001266

October 27, 2000

FOREWORD

Air Quality Technical Services, Inc., an environmental consulting company specializing in air resource management and air quality assessment, has been contracted by OMYA, Inc. to conduct a source emission compliance program at the non-metallic mineral processing facility it owns and operates in Florence, Vermont.

This report presents program results, test and analytical data, sampling and analytical methods, and other relevant data.

To the best of my knowledge the data contained herein are correct and reliable.

John J. Jasko
President

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1.0 INTRODUCTION

The State of Vermont Agency of Natural Resources Department of Environmental Conservation, Air Pollution Control Division (APCD), issued OMYA, Inc. (OMYA) an Amended Air Pollution Control Permit to Construct and Operate (#AOP-98-015a) on October 26, 1999, for a third flash dryer (Flash Dryer #3) at the Verpol facility it owns and operates in Florence, Vermont.

Condition (11) of the Permit states that at no time shall OMYA cause to be emitted from any fabric filter dust collector any stack visible emissions (VE) that exhibit greater than 7% opacity.

Condition (12) of the Permit limits the emission of particulate matter (PM) concentration from each fabric filter to 0.01 grains per dry standard cubic foot (gr/dscf) of undiluted exhaust gas, and further limits the time based emission rate of PM from Flash Dryer #3 to 0.86 pounds per hour (lbs/hr).

Condition (32) of the Permit requires that OMYA conduct PM and VE testing on Flash Dryer #3 to demonstrate compliance with the aforementioned standards and furnish the Agency with a written report of the results within 180 days after achieving normal operation.

The particulate emission portion of the compliance program was originally initiated and two test runs were completed on August 10, 2000. Test run 1-1 was interrupted on several occasions due to process upsets and was ultimately declared void due to the inability to demonstrate that the sample train met the post test leak check requirement. Test run 1-2 was completed without interruption and was deemed valid. On August 11 another run, test run 1-3, was started but was terminated after approximately 30 minutes due to a major process malfunction. The field portion of the compliance test program was rescheduled for September 27 and two runs, test runs 1-4 and 1-5, were completed. An attempt was made to complete an additional test run on September 28 but was aborted due to another major process malfunction.

The visible emission portion of the comliance program was not performed in conjunction with the particulate emission compliance evaluation. At the start of the initial program on August 10, the decision was made to place emphasis on completing particulate emission testing because of the uncertain operation of the process.

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The major on-site representatives that participated in the field portion of the particulate emission compliance program, rescheduled for September 27, and their respective affiliations were:

OMYA, Inc.
- Neal Jordan - Environmental Engineer
- Jim Prior - Engineer

State of Vermont Agency of Natural Resources, Air Pollution Control Division
- Dave Manning - Environmental Technician

Air Quality Technical Services, Inc.
- John Jasko - Project Director
- Roland Tremble - Environmental Technician

AQTS AIR QUALITY TECHNICAL SERVICES, INC.
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2.0 SUMMARY OF RESULTS

Particulate matter was measured as a non-filterable sample fraction collected by a filter media and preceding section of sample train. This fraction includes particulates greater than or equal to the particle cut point size of the filter media (0.3 μ).

2.1 FLASH DRYER #3

2.1.1 Particulate Matter

The concentrations of PM for the two test runs conducted September 27 were 0.0031, and 0.0026 gr/dscf, respectively, with an average of 0.0029 gr/dscf. The corresponding emission rates of PM were 0.31 and 0.29 lbs/hr with an average of 0.30 lbs/hr.

A summary of the PM test determinations for Flash Dryer #3 is presented in Table 2-1.

TEST DATA SUMMARY

FLASH DRYER #3

PARTICULATE MATTER			
Test Run	1-4	1-5	Average
Date	09/27/2000	09/27/2000	----
Clock Time (24 hour)	13:08-14:48	16:15-17:58	----
Test Duration (minutes)	96	96	----
Sample Volume (dscf)	75.265	81.754	----
Test Measurements			
Isokinetics (%)	96.4	95.1	----
Moisture Content (%)	17.2	15.1	16.1
Temperature (°F)	287.0	282.2	284.6
Gas Composition - CO_2 (%)	2.0	2.0	2.0
O_2 (%)	18.5	18.5	18.5
CO (%)	0	0	0
N_2 (%)	79.5	79.5	79.5
Gas Velocity (fps)	68.8	73.9	71.3
Gas Volumetric Flow (dscfm)	11721	12909	12315
(acfm)	20264	21767	21016
Emission Determinations			
Particulate:			
Concentration (gr/dscf)	0.0031	0.0026	0.0028
Emission Rate (lbs/hr)	0.31	0.29	0.30

Table 2-1

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3.0 COMPLIANCE PROCEDURES

The procedures used in the source emission compliance/evaluation programs were conducted in accordance with standard methods described in **40 CFR 60** (revised July 1, 1999), **Standards of Performance for New Stationary Sources, Appendix A - Test Methods.**

The test methods used for the determination of compliance are referenced as follows:

Method 1 - Sample Velocity Traverses for Stationary Sources;
Method 2 - Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube);
Method 3 - Gas Analysis for Determination of Dry Molecular Weight;
Method 4 - Determination of Moisture Content in Stack Gas
Method 5 - Determination of Particulate Emissions form Stationary Sources.

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3.1 SAMPLING LOCATION

The sampling ports were positioned according to Method 1 - Sample and Velocity Traverses for Stationary Sources (40 CFR 60, App. A, pp. 577 - 584).

3.1.1 Flash Dryer #3

Two sample ports were located 90° opposed on the stack approximately 132 inches from the top of a silencer located in the stack and approximately 30 inches from the discharge of the stack. At the sample port location the stack had an inside diameter of 30.5 inches. These dimensions placed the sample ports approximately 4.3 diameters downstream and 1.0 diameters upstream from respective flow disturbances.

In accordance with Method 1 a minimum of twenty-four sample points were required for a particulate traverse. Twelve traverse points positioned at 2.1, 6.7, 11.8, 17.7, 25.0, 35.6, 64.4, 75.0, 82.3, 88.2, 93.3 and 97.9 percent of the diamenter (1.0, 2.0, 3.6, 5.4, 7.6, 10.9, 19.6, 22.9, 25.1, 26.9, 28.5, and 29.5 inches from the inner stack wall) were sampled through each port.

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3.2 PARTICULATE

Sample collection and analysis was performed according to procedures outlined in Method 5 - Determination of Particulate Emissions from Stationary Sources (40 CFR 60, App. A, pp. 740 - 764).

A total of two test runs were conducted for the purpose of determining compliance. Each test run had a sample duration of 96 minutes and collected a volume close to or in excess of the 60 dscf required by 40 CFR Part 60, Subpart OOO for PM concentration determination (§ 60.675 Test Methods and Procedures). A sampling rate, +/- 10 percent of the isokinetic rate, was maintained over the course of each test run.

3.2.1 Sampling Apparatus

3.2.1.1 Particulate

The PM sample train consisted of:

a) a stainless steel nozzle sized to maintain isokinetic sampling;
b) a borosilicate glass-lined probe heated to a temperature of 250 °F, +/- 25 °F;
c) an encased glass fiber filter heated to a temperature of 250 °F, +/- 25 °F;
d) a sample/moisture condensing unit with four 500 ml glass impingers immersed in an ice water bath:
   1 modified Greenburg-Smith type containing a volume of H_2O tared to a known weight,
   1 Greenburg-Smith type containing a volume of H_2O tared to a known weight,
   1 modified Greenburg-Smith type empty tared to a known weight; and,
   1 modified Greenburg-Smith type containing silica gel tared to a known weight;
e) an umbilical; and,
f) a metering console with: main valve and by-pass valve for flow adjustment, leak-free pump, calibrated dry gas meter with inlet and outlet temperature gauges, calibrated orifice, and inclined manometer.

The typical sampling apparatus is depicted in Figure 3-1.

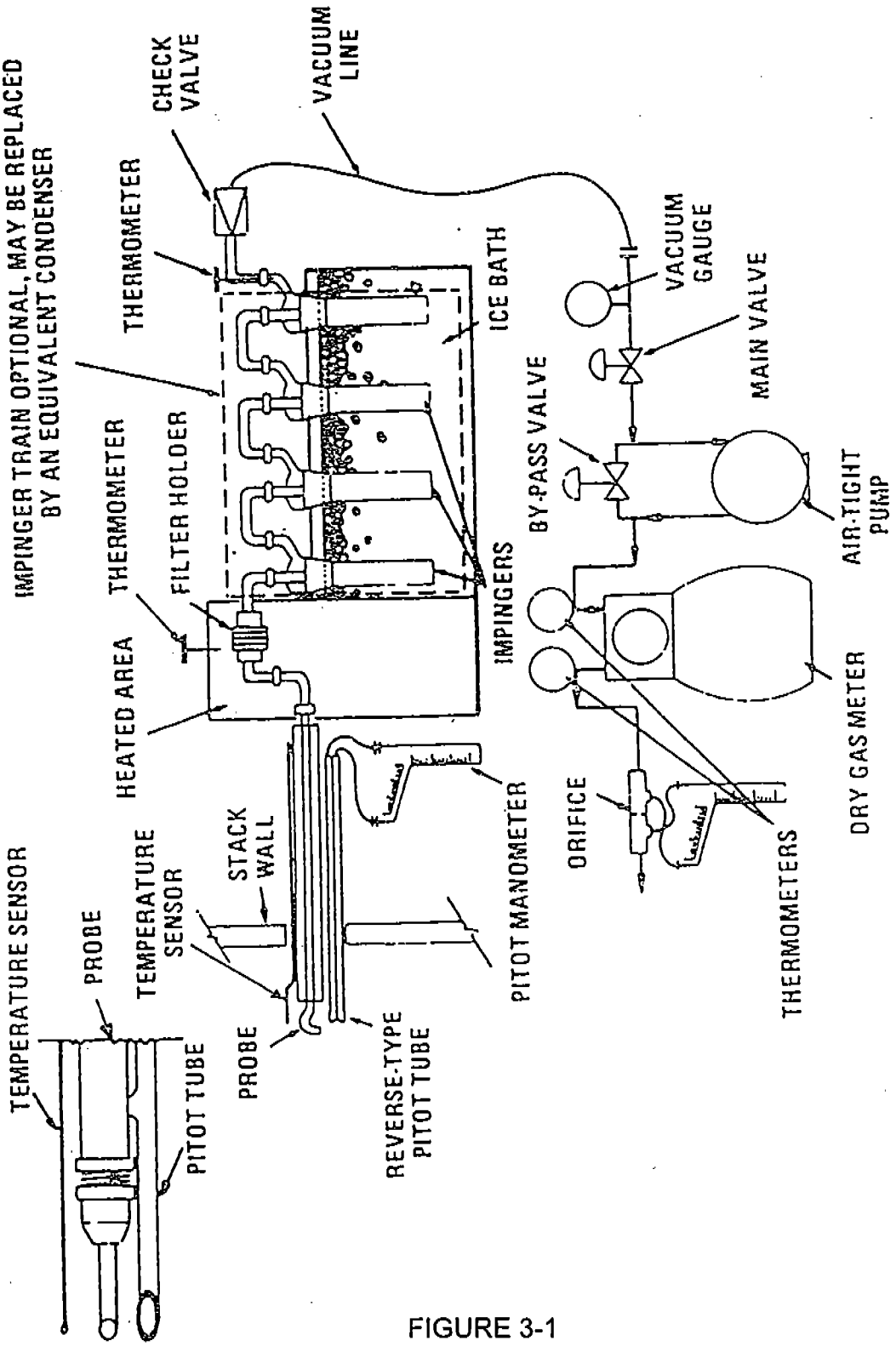

FIGURE 3-1

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3.2.2 Sample Recovery

3.2.2.1 Field

The samples were handled or recovered in the field using the procedures outlined below:

Filter - The filter holder was removed from the sample box, sealed, labeled for identification, and secured for transport.

Front half - The nozzle and probe were internally brushed and rinsed with acetone to remove any particulate matter which may have been deposited during a test run. The rinse was collected in a glass jar, sealed with a Teflon lined cap, labeled for identification noting the volume of the contents, and secured for transport.

Impinger catch - The first three impingers were weighed to determine the net weight gain attributable to condensed moisture which was recorded.

Silica gel - The silica gel impinger was weighed to determine the net weight gain attributable to condensed moisture which was recorded.

3.2.2.2 Laboratory

The samples were recovered in the laboratory using the procedures outlined below:

Filter - The filter was removed from the filter holder and placed in the original container.

Front half - The front half of the filter holder was internally brushed and rinsed with acetone, and the filter support frit gasket was scraped off under an acetone rinse to recover any adhering filter media; this rinse was combined with the front half acetone rinse collected in the field.

3.2.3 Sample Analysis

3.2.3.1 Particulate

Prior to use in the program, glass fiber filters were marked with an identifying number, desiccated for a minimum of 24 hours, weighed, re-desiccated for a minimum of 6 hours, re-weighed to establish a final constant weight (<0.5 mg difference), and,

sealed in individual plastic petri dish containers that were labeled with the identifying number and tare weight of the filter.

After use in the program, the filters were placed in a dessicator, desiccated for a minimum of 24 hours, weighed, re-dessicated for a minimum of 6 hours, re-weighed to establish a final constant weight (<0.5 mg difference).

The front half acetone washes were transferred to tared beakers, evaporated, desiccated for a minimum of 24 hours, weighed, re-dessicated for a minimum of 6 hours, re-weighed to establish a final constant weight (<0.5 mg difference).

3.3 GAS VELOCITY/VOLUMETRIC FLOW

Measurements of stack gas velocity and volumetric flow were performed according to procedures outlined in Method 2 - Determination of Stack Gas Velocity and Volumetric Flow Rate (40 CFR 60, App. A, pp. 586 - 603).

3.3.1 Measurement Apparatus

The apparatus used to measure stack differential pressure and temperature profiles consisted of:

a) a Type S (Stausscheibe) pitot tube with an assigned design coefficient of 0.84 connected to an inclined manometer; and,

b) Type-K thermocouple probe connected to a digital pyrometer.

3.4 GAS COMPOSITION

Carbon dioxide (CO_2) and oxygen (O_2) sample collection and analyses was performed according to procedures outlined in using EPA Test Method 3 - Gas Analysis for the Determination of Dry Molecular Weight (40 CFR 60, App. A, pp. 726 - 729).

A single-point grab sample was taken and analyzed with Fyrite analyzers to measure the CO_2 and O_2 concentrations. The balance of the gas composition was considered N_2. The results were used to determine the dry molecular weight of the effluent stream.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

Air Quality Technical Services, Inc. maintains a QA/QC program to ensure sampling techniques and analytical procedures are valid and data generated from test programs are accurate.

4.1 CHAIN OF CUSTODY

AQTS utilizes chain-of-custody procedures. While in the field, samples collected during each test run are sealed in appropriate sample vessels, labeled and identified by field number, and placed in secure containers. Storage containers are the responsibility of the project director or assigned personnel. Upon return to AQTS facilities, samples are logged in and assigned sample identification numbers. Samples are safely and properly stored until processed and/or shipped to an outside laboratory.

4.2 EQUIPMENT CALIBRATIONS

Dry gas meters and orifices undergo semi-annual calibration according to procedures outlined in Method 5, Section 5 - Calibration (§5.3 Metering System, §5.3.1 Calibration Prior to Use). After completion of compliance programs, dry gas meter calibrations are rechecked for accuracy according to procedures outlined in Method 5, Section 5 - Calibration (§5.3 Metering System, §5.3.2 Calibration After Use).

Prior to use in compliance programs, probe nozzles are calibrated according to procedures outlined in Method 5, Section 5 - Calibration (§5.1 Probe Nozzle).

Thermometers and barometers are calibrated according to Method 6, §5.2 and §5.4.

Prior to field use, pitot tube assemblies are checked for conformity with the design specifications listed in Method 2 (4. Calibration, §4.1 Type S Pitot Tube, §4.1.1 Type S Pitot Tube Assemblies).

Thermocouple probes undergo annual calibration according to procedures outlined in the Quality Assurance Handbook, Section 3.1 - Method 2 (§3.1.2 Calibration of Apparatus).

4.3 EQUIPMENT LEAK CHECKS

4.3.1 Particulate Sample Trains

Sample trains are leak checked according to procedures outlined in Method 5, Section 4 - Procedure (§4.1 Sampling, §4.1.4 Leak-Check Procedures). Before the start of each test run, the inlet of the probe nozzle is plugged and a vacuum of approximately 15" Hg is drawn and held. The metering dial is timed for a period of one minute and any movement during that period is noted. At the end of each test run, the same procedure is followed using the highest vacuum attained during the run. In each instance, the maximum acceptable leakage rate is 0.02 cfm.

4.3.2 Pitot Tubes

Pitot tubes are leak checked according to procedures outlined in Method 2 (§3. Procedure, §3.1). The pitot tubes are subjected to leak checks prior to and after a test run. The impact opening of a pitot is blown through until a minimum pressure of 3" H_2O registers on an inclined manometer. The impact opening is then closed off and a pressure reading observed. The reading must remain stable for a period of 15 seconds to be accepted. The same procedure is used to check the static pressure side of the pitot by applying suction to the static opening.

4.4 METHOD BLANKS

Method blanks (filters, absorbing solution, rinses, and digestion media) are handled and processed like actual samples. The blanks are weighed, evaporated, digested, and analyzed accordingly. Blanks reported greater than analytical detection levels are subtracted from sample results.

4.5 DATA REDUCTION AND HANDLING

Data are generally reported in English units, however, metric units are reported as requested by clients or regulatory agencies. The flow of data conforms to standard chain-of-custody procedures. Raw data generated from AQTS emission evaluation and compliance test programs are reduced using Lotus 1-2-3 or data acquisition systems. Calculations generally follow equations found in 40 CFR 60, Appendix A, Test Methods

or other air pollution and engineering references. Spreadsheet equations and calculations are frequently verified using scientific calculators. Isokinetic tests are manually recorded on data sheets and/or Lotus spreadsheets. Isokinetic sample rates are adjusted using a spreadsheet and/or slide rule nomograph.

APPENDIX A

METHOD 5
PARTICULATE EQUATION FORMAT

Volume of dry gas sampled at standard conditions, 68 °F, 29.92 "Hg - Vm_{std} (scf):

$$Vmstd = 17.65\ (Vm)\ (Y)\ \sqrt{\frac{Pb + \frac{\Delta H}{13.6}}{Tm + 460}}$$

Stack gas moisture condensed at standard conditions - Vwstd (scf):

$$Vwstd = 0.04707\ (Vlc)$$

Decimal fraction stack gas proportion of water by volume - Bwo

$$Bwo = \frac{Vw_{std}}{Vw_{std} + Vm_{std}}$$

Stack gas dry molecular weight - MW_d (lb/lb-mole):

$$MWd = 0.44\ (\%CO2) + 0.32\ (\%O2) + 0.28\ (\%N2 + \%CO)$$

Stack gas molecular weight - MWs (lb/lb-mole):

$$MWs = MWd\ (1 - Bwo) + 18\ (Bwo)$$

Pressure of stack - Ps (in. Hg):

$$Ps = Pb + (Pst/13.6)$$

Stack gas velocity at stack conditions - Vs (fps):

$$Vs = 85.49\ (Cp)\ (\sqrt{\Delta P})_{avg}\ \sqrt{\frac{Ts + 460}{(Ps)\ (MW_s)}}$$

Stack gas volumetric flow rate at standard conditions - Qs_s (scfm):

$$Qss = 60\ (Vs)\ (As)\ (\frac{528}{Ts + 460})(\frac{Ps}{29.92})$$

Stack gas volumetric flow rate at actual conditions - Qsa (acfm):

$$Qsa = 60\ (Vs)\ (As)$$

Stack gas volumetric flow at dry standard conditions - Qsd(dscfm):

$$Qsd = (60)\ (1 - Bwo)\ (Vs)\ (As)\ (\frac{528}{Ts + 460})\ (\frac{Ps}{29.92})$$

Concentration of particulate matter in stack gas, dry basis, standard conditions - Cs (gr/dscf)

$$Cs = 15.432 \left(\frac{Mp}{Vm_{std}}\right)$$

Emission rate of particulate matter, dry basis, standard conditions - ER (lbs/hr)

$$ER = 0.00857\ (Qsd)\ (Cs)$$

Isokinetic variation - Iso (%)

$$Iso = \frac{17.33\ (Ts + 460)\left[0.04707\ (Vlc) + Vm_{std}\right]}{\theta\ (Vs)\ (Ps)\ (Dn^2)}$$

Where:

As = Cross section area of stack (ft2)
Cp = Pitot tube coefficient
Dn = Diameter of nozzle (in.)
ΔH = Pressure differential across orifice (in. H2O)
Mp = Mass of particulate in grams
Pb = Barometric pressure (in. Hg)
Pst = Static pressure of stack (in. H2O)
Pstd = Standard pressure, 29.92 (in. H2O)
ΔP = Stack differential pressure (in. H2O)
Tm = Average temperature of dry gas meter (°F)
Ts = Average stack temperature (°F)
Tstd = Standard temperture, 68 (°F)
Vlc = Volume of liquid condensate (ml)
Vm = Volume of dry gas sample metered (ft^3)
Y = Dry gas meter correction factor
θ = Sample duration (min.)
0.00857 = Conversion factor, gr to lbs and min. to hr.
0.04707 = Conversion factor, ml to ft^3
0.264 = ratio of O_2 to N2 in air, v/v
15.432 = Conversion factor, g/ft^3 to gr/ft^3
17.65 = Conversion factor, standard temperature and pressure
17.33 = Isokinetic constant from factoring
18 = Molecular weight of water
85.49 = Pitot tube constant

APPENDIX B

FIELD DATA TEST RESULTS

CLIENT: OMYA, INC.
FACILITY: FLORENCE, VT
PROJECT: 001266
UNIT: FLASH DRYER 3
TEST DATE: September 27, 2000
TEST RUN: 1-4

TEST DATA SUMMARY

INPUT VALUES			
Pitot Coefficient - Cp:	0.84	Average Delta P (" H2O):	1.002
Nozzle Diameter - Dn (in):	0.25	Average Delta H ("H2O):	2.043
Dry Gas Meter Cal. (Y):	1.004	Stack Temperature - Ts (°F):	287
Stack Area (ft^2):	4.909	Meter Temperature - Tm (°F):	103
Barometric Press. - Pb ("Hg):	29.61	Average Square Root of Delta P:	0.993
Static Press. - Pst ("Hg):	-0.51	Mass of Particulate Collected - Mp - (g.):	0.0152
Sample Duration (min.):	96		
Volume of Gas Metered - Vm (ft^3):	80.86		
Volume of Water Condensed - Vlc (g.):	332		
Oxygen - O2 (%):	18.5		
Carbon Dioxide - CO2 (%):	2		
Carbon Monoxide - CO (%):	0		
Nitrogen - N2 (%):	79.5		

OUTPUT VALUES	
Dry Gas Volume (Standard) - Vmstd (dscf):	75.265
Volume of Water (Standard) - Vwstd (scf):	15.627
Stack Gas Water Proportion by Volume - Bwo:	0.172
Molecular Weight of Dry Stack Gas - MWd (lb/lb-mole):	29.06
Molecular Weight of Stack Gas - MWs (lb/lb-mole):	27.16
Pressure of Stack - Ps ("Hg.):	29.57
Velocity of Stack Gas - Vs (fps):	68.8
Dry Standard Volumetric Flow of Stack Gas - Qdscfm:	11721
Actual Volumetric Flow of Stack Gas - Qacfm:	20264
Test Isokinetic Sample Rate (%):	96.4
Particulate Concentration of Stack Gas - Cs (gr/dscf):	0.0031
Particulate Emission Rate - ER (lbs/hr):	0.31

FIELD DATA TEST RESULTS

CLIENT: OMYA, INC.
FACILITY: FLORENCE, VT
PROJECT: 001266
UNIT: FLASH DRYER 3
TEST DATE: September 27, 2000
TEST RUN: 1-5

TEST DATA SUMMARY

INPUT VALUES			
Pitot Coefficient - Cp:	0.84	Average Delta P (" H2O):	1.176
Nozzle Diameter - Dn (in):	0.25	Average Delta H ("H2O):	2.488
Dry Gas Meter Cal. (Y):	1.004	Stack Temperature - Ts (°F):	282.2
Stack Area (ft^2):	4.909	Meter Temperature - Tm (°F):	97
Barometric Press. - Pb ("Hg):	29.42	Average Square Root of Delta P:	1.072
Static Press. - Pst ("Hg):	-0.51	Mass of Particulate Collected - Mp - (g.):	0.0137
Sample Duration (min.):	96		
Volume of Gas Metered - Vm (ft^3):	87.457		
Volume of Water Condensed - Vlc (g.):	309.7		
Oxygen - O2 (%):	18.5		
Carbon Dioxide - CO2 (%):	2		
Carbon Monoxide - CO (%):	0		
Nitrogen - N2 (%):	79.5		

OUTPUT VALUES	
Dry Gas Volume (Standard) - Vmstd (dscf):	81.754
Volume of Water (Standard) - Vwstd (scf):	14.578
Stack Gas Water Proportion by Volume - Bwo:	0.151
Molecular Weight of Dry Stack Gas - MWd (lb/lb-mole):	29.06
Molecular Weight of Stack Gas - MWs (lb/lb-mole):	27.39
Pressure of Stack - Ps ("Hg.):	29.38
Velocity of Stack Gas - Vs (fps):	73.9
Dry Standard Volumetric Flow of Stack Gas - Qdscfm:	12909
Actual Volumetric Flow of Stack Gas - Qacfm:	21767
Test Isokinetic Sample Rate (%):	95.1
Particulate Concentration of Stack Gas - Cs (gr/dscf):	0.0026
Particulate Emission Rate - ER (lbs/hr):	0.29

APPENDIX C

OMYA, INC., FLORENCE, VT

PROJECT: 001266 **FLASH DRYER #3**

PARTICULATE CONCENTRATION AND EMISSION DATA

SAMPLE ID	TEST RUN	GROSS SAMPLE MASS (g)	NET SAMPLE MASS (g)	AIR VOLUME SAMPLED (dscf)	EMISSION CONCENTRATIONS (gr/dscf)	(mg/dscm)	(lbs/dscf)	VOLUMETRIC AIR FLOW (dscfm)	EMISSION RATE (lbs/hr)
C823/C824	1-4	0.0169	0.0152	75.265	0.0031	7.13	4.45E-007	11721	0.31
C825/C826	1-5	0.0154	0.0137	81.754	0.0026	5.92	3.69E-007	12909	0.29
C828	BLANK	0.0017							
VERAGES					**0.0029**	**6.53**	**4.07E-007**	**12315**	**0.30**

APPENDIX D

ISOKINETIC STACK CALCULATOR

(Revised 06/03/96)

INPUT PARAMETERS	
PITOT COEFFICIENT (Cp):	0.84
METER TEMPERATURE (°F):	115
STACK TEMPERATURE (°F):	305
AVERAGE DELTA P ("H2O):	1
MAXIMUM DELTA P ("H2O):	1.3
ESTIMATED MOISTURE (%):	20
METER BOX NUMBER:	1286-340
DELTA H @:	1.699

NOZZLE DIAMETER (Dn) DATA	
CALCULATED DIAMETER (in.):	0.2331
SELECTED SIZE (in.):	0.25

CALCULATED PARAMETERS	
K FACTOR =	2.0715
ISOKINETIC DELTA H ("H2O) =	2.07
MAX DELTA H ("H2O) =	2.69

SAMPLING PARAMETERS	
MIMIMUM SAMPLE VOLUME REQUIRED (dscf):	60
SAMPLE TIME REQUIRED (min):	82
SAMPLE RATE > 0.75 CFM	0.83
MAX SAMPLE RATE > 0.75 cfm:	0.94

PROJECT NUMBER:	001266
TEST RUN NUMBER:	1-4

METHOD 5

CLIENT: OMYA, INC.
FACILITY: FLORENCE, VT
PROJECT: 001266
UNIT: FLASH DRYER 3
TEST DATE: September 27, 2000
TEST RUN: 1-4

Run Clock Time (24-Hr.): 01:08-14:48
Sample Duration (min.): 96
Number of Sample Points: 24

Barometric Press. - Pb ("Hg):	29.61
Static Press. - Pst ("H2O):	-0.51
Stack Press. - Ps ("Hg.):	29.57
Pitot Coefficient - Cp:	0.84
Nozzle Number:	B-4
Nozzle Diameter - Dn (in):	0.250
Meter Box Number:	1286-340
Dry Gas Meter Cal. (Y):	1.004
Stack area (ft^2):	4.909
Filter Number(s):	110-787

Impinger Volume (ml)		
	Initial	Final
1>	585.7	836.9
2>	575.4	626
3>	480.9	488.8
Silica Gel (g)		
	Initial	Final
4>	743.6	765.9
Total Volume>		332.0

Pitot Leak Checks		
Pre-test:	Positive	OK
	Negative	OK
Post-test:	Positive	OK
	Negative	OK

Vacuum Leak Check		
	Leak Rate (cf.)	Vacuum ("Hg.)
Pre-test:	0.017	16
Post-test:	0.008	10

Gas Composition	
O2	18.5
CO2	2
CO	0
N2	79.5

SAMPLE POINT	CLOCK TIME (24 Hr)	GAS METER READING (cf)	DELTA P (In. H20)	DESIRED DELTA H (In. H20)	ACTUAL DELTA H (In. H20)	TEMPERATURES (°F)			SQUARE ROOT DELTA P	PERCENT ISO
						STACK	DRY GAS METER			
							INLET	OUTLET		
N1	01:08 PM	7.614	0.75	1.55	1.55	280	102	82	0.866	101.8
2	01:12 PM	10.57	0.78	1.62	1.62	285	117	83	0.883	97.9
3	01:16 PM	13.5	0.84	1.74	1.74	285	114	85	0.917	100.5
4	01:20 PM	16.62	1.2	2.49	2.49	296	119	86	1.095	100.1
5	01:24 PM	20.32	1.4	2.9	2.9	305	123	87	1.183	98.7
6	01:28 PM	24.25	1.5	3.11	3.11	287	124	88	1.225	99.3
7	01:32 PM	28.4	1.1	2.28	2.28	287	122	89	1.049	99.4
8	01:36 PM	31.96	0.88	1.82	1.82	285	119	89	0.938	99
9	01:40 PM	35.13	0.9	1.86	1.86	283	119	89	0.949	99
10	01:44 PM	38.34	0.72	1.49	1.49	278	117	89	0.849	98.3
11	01:48 PM	41.2	0.52	1.08	1.08	276	115	89	0.721	99.1
12	01:52 PM	43.65	0.54	1.12	1.12	275	116	89	0.735	101.8
END	01:56 PM	46.219								
B1	02:00 PM	46.219	1.2	2.49	2.49	291	112	87	1.095	97.1
2	02:04 PM	49.8	1.1	2.28	2.28	290	120	87	1.049	100
3	02:08 PM	53.36	1.1	2.28	2.28	292	122	87	1.049	99.1
4	02:12 PM	56.89	1.1	2.28	2.49	285	122	88	1.049	99.4
5	02:16 PM	60.45	1.2	2.49	2.49	295	122	88	1.095	101.3
6	02:20 PM	64.21	1.2	2.49	2.49	293	121	88	1.095	100.7
7	02:24 PM	67.95	1.2	2.49	2.49	293	121	88	1.095	100.9
8	02:28 PM	71.7	1.2	2.49	2.28	286	121	89	1.095	100.3
9	02:32 PM	75.45	1.1	2.28	1.91	290	121	89	1.049	100.7
10	02:36 PM	79.05	0.92	1.91	1.76	286	119	90	0.959	99.5
11	02:40 PM	82.31	0.85	1.76	1.55	284	116	90	0.922	100.1
12	02:44 PM	85.46	0.74	1.53	1.46	280	115	90	0.86	102.5
END	02:48 PM	88.474								

ISOKINETIC STACK CALCULATOR

(Revised 06/03/96)

INPUT PARAMETERS	
PITOT COEFFICIENT (Cp):	0.84
METER TEMPERATURE (°F):	100
STACK TEMPERATURE (°F):	300
AVERAGE DELTA P ("H2O):	1
MAXIMUM DELTA P ("H2O):	1.3
ESTIMATED MOISTURE (%):	18
METER BOX NUMBER:	1286-340
DELTA H @:	1.699

NOZZLE DIAMETER (Dn) DATA	
CALCULATED DIAMETER (in.):	0.2334
SELECTED SIZE (in.):	0.25

CALCULATED PARAMETERS	
K FACTOR =	2.1161
ISOKINETIC DELTA H ("H2O) =	2.12
MAX DELTA H ("H2O) =	2.75

SAMPLING PARAMETERS	
MIMIMUM SAMPLE VOLUME REQUIRED (dscf):	60
SAMPLE TIME REQUIRED (min):	81
SAMPLE RATE > 0.75 CFM	0.84
MAX SAMPLE RATE > 0.75 cfm:	0.95

PROJECT NUMBER: 001266

TEST RUN NUMBER: 1-5

APPENDIX E

METHOD 5

CLIENT: OMYA, INC.
FACILITY: FLORENCE, VT
PROJECT: 001266
UNIT: FLASH DRYER 3
TEST DATE: September 27, 2000
TEST RUN: 1-5

Run Clock Time (24-Hr.): 16:15-17:58
Sample Duration (min.): 96
Number of Sample Points: 24

Barometric Press. - Pb ("Hg):	29.42
Static Press. - Pst ("H2O):	-0.51
Stack Press. - Ps ("Hg.):	29.38
Pitot Coefficient - Cp:	0.84
Nozzle Number:	B-4
Nozzle Diameter - Dn (in):	0.250
Meter Box Number:	1286-340
Dry Gas Meter Cal. (Y):	1.004
Stack area (ft²):	4.909
Filter Number(s):	110-788

Impinger Volume (ml)		
	Initial	Final
1>	576.5	813
2>	586.5	631.3
3>	516.2	523.7
Silica Gel (g)		
	Initial	Final
4>	675.9	696.8
Total Volume>		309.7

Pitot Leak Checks		
Pre-test:	Positive	OK
	Negative	OK
Post-test:	Positive	OK
	Negative	OK

Vacuum Leak Check		
	Leak Rate (cf.)	Vacuum ("Hg.)
Pre-test:	0.006	15
Post-test:	0.003	10

Gas Composition	
O2	18.5
CO2	2
CO	0
N2	79.5

SAMPLE POINT	CLOCK TIME (24 Hr)	GAS METER READING (cf)	DELTA P (In. H20)	DESIRED DELTA H (In. H20)	ACTUAL DELTA H (In. H20)	TEMPERATURES (°F)			SQUARE ROOT DELTA P	PERCENT ISO.
						STACK	DRY GAS METER			
							INLET	OUTLET		
E1	04:15 PM	89.928	1.2	2.54	2.54	280	84	73	1.095	101.1
2	04:19 PM	93.63	1.8	3.81	3.81	291	99	74	1.342	98.6
3	04:23 PM	98.07	1.8	3.81	3.81	281	105	76	1.342	98.1
4	04:27 PM	102.55	1.8	3.81	3.81	290	108	78	1.342	97.5
5	04:31 PM	107	1.5	3.17	3.17	282	109	80	1.225	98.2
6	04:35 PM	111.13	1.3	2.75	2.75	283	110	82	1.14	99.9
7	04:39 PM	115.05	1.1	2.33	2.33	285	110	83	1.049	99.1
8	04:43 PM	118.63	0.98	2.07	2.07	289	111	84	0.99	97.7
9	04:47 PM	121.96	0.92	1.95	1.95	294	111	85	0.959	98.6
10	04:51 PM	125.21	0.88	1.86	1.86	283	111	85	0.938	97.3
11	04:55 PM	128.37	0.74	1.57	1.57	280	110	86	0.86	96.1
12	04:59 PM	131.24	0.62	1.31	1.31	276	109	86	0.787	98.2
END	05:03 PM	133.93								
B1	05:10 PM	133.93	1.2	2.54	2.54	279	108	85	1.095	104.3
2	05:14 PM	137.88	1.5	3.17	3.17	284	115	86	1.2[illegible]	100.8
3	05:18 PM	142.16	1.5	3.17	3.17	282	115	87	[illegible]	96.6
4	05:22 PM	146.27	1.5	3.17	3.17	280	114	88	[illegible]	96.3
5	05:26 PM	150.37	1.2	2.54	2.54	286	113	89	[illegible]	98.7
6	05:30 PM	154.12	1.3	2.75	2.75	279	113	8[illegible]	[illegible]	97.7
7	05:34 PM	158	1	2.12	2.12	278	112	[illegible]	[illegible]	[illegible]3
8	05:38 PM	161.43	1	2.12	2.12	280	112	[illegible]	[illegible]	[illegible]
9	05:43 PM	164.79	1	2.12	2.12	282	112	[illegible]	[illegible]	[illegible]
10	05:46 PM	168.28	0.94	1.99	1.99	279	112	[illegible]	[illegible]	[illegible]
11	05:50 PM	171.53	0.82	1.74	1.74	276	[illegible]	[illegible]	[illegible]	[illegible]
12	05:54 PM	174.64	0.62	1.31	1.31	273	[illegible]	[illegible]	[illegible]	[illegible]
END	05:58 PM	177.385								

600099

APPENDIX E

FILTER TARE WEIGHT LOG

CLIENT:	OMYA, Inc.
PROJECT:	001266
FILTER TYPE:	GFF
SIZE:	110 mm

Filter Number	Date/Time			
	Weight (g)			
110 786				
110 787	08/21/00 08:00	08/23/00 09:00		
	0.5780	0.5779		
110 788	08/21/00 08:00	08/23/00 09:00		
	0.5816	0.5817		
110 789	08/21/00 08:00	08/23/00 09:00		
	0.5768	0.5769		
110 790	08/21/00 08:00	08/23/00 09:00		
	0.5838	0.5838		
110 791	08/21/00 08:00	08/23/00 09:00		
	0.5822	0.5822		
110 792	08/21/00 08:00	08/23/00 09:00		
	0.5853	0.5853		
110 793	08/21/00 08:00	08/23/00 09:00		
	0.5823	0.5824		
110 794	08/21/00 08:00	08/23/00 09:00		
	0.5836	0.5836		
110 795	08/21/00 08:00	08/23/00 09:00		
	0.5863	0.5862		
110 796	08/21/00 08:00	08/23/00 09:00		
	0.5883	0.5884		
110 797	08/21/00 08:00	08/23/00 09:00		
	0.5835	0.5836		
110 798	08/21/00 08:00	08/23/00 09:00		
	0.5836	0.5836		
110 799	08/21/00 08:00	08/23/00 09:00		
	0.5832	0.5832		
110 800				
110 801				
110 802				
110 803				
110 804				
110 805				

SAMPLE LOG/CHAIN OF CUSTODY RECORD

AQTS CLIENT:	OMYA, INC.
PROJECT:	001266

Sample Number	Date Collected	Date Received	Test Number	Description
C823	09/27/00	09/29/00	1-4	GFF 110-787
C824	09/27/00	09/29/00	1-4	Front half acetone wash - 150 A/R
C825	09/27/00	09/29/00	1-5	GFF 110-788
C826	09/27/00	09/29/00	1-5	Front half acetone wash - 130 A/R
C827	NA	NA	All	GFF 110-793 filter blank
C828	09/28/00	09/29/00	All	Acetone blank

Samples Logged By:	John J. Jasko	Date:	09/29/00	Time:	10:00

Samples Relinquished By:			Date:		Time:		
Samples Received By:			Date:		Time:		

BEAKER TARE WEIGHT LOG SHEET

Client: OMYA, Inc.
Facility: Florence, VT
Project: 001266 - FD#3

Beaker Number	Date/Time				
	Tare Weight (g.)				
25/3	10/03/00 - 07:00	10/07/00 - 14:30	10/08/00 - 12:50		
	105.7073	105.7066	105.7065		
25/7	10/03/00 - 07:00	10/07/00 - 14:30	10/08/00 - 12:50		
	99.9606	99.9596	99.9594		
25/15	10/03/00 - 07:00	10/07/00 - 14:30	10/08/00 - 12:50	10/09/00 - 08:45	
	106.1155	106.1140	106.1130	106.1128	

SAMPLE WEIGHT LOG SHEET

Client: OMYA, Inc.
Facility: Florence, VT
Project: 001266 - FD#3

Sample Number	Identification	Date/Time			
	Tare Weight (g.)	Gross Weight (g.)			
C823	GFF 110-787	10/03/00 - 07:00	10/19/00 - 06:30	10/19/00 - 17:45	10/20/00 - 07:00
	0.5779	0.6038	0.5795	0.5788	0.5789
C824	Beaker 25/3	10/20/00 - 07:00	10/20/00 - 19:00	10/21/00 - 08:30	
	105.7065	105.7236	105.7222	105.7224	
C825	GFF 110-788	10/03/00 - 07:00	10/19/00 - 06:30	10/19/00 - 17:45	10/20/00 - 07:00
	0.5817	0.5833	0.5818	0.5807	0.5807
C826	Beaker 25/7	10/20/00 - 07:00	10/20/00 - 19:00	10/21/00 - 08:30	
	99.9594	99.9771	99.9758	99.9758	
C827	GFF 10-793	10/03/00 - 07:00			
	0.5824	0.5823			
C828	Beaker 25/15	10/20/00 - 07:00	10/20/00 - 19:00	10/21/00 - 08:30	
	106.1128	106.1153	106.1143	106.1145	

PARTICULATE LAB ANALYSIS
SUMMARY SHEET

Client: OMYA, Inc. Project Number: 001266 Test/Run: 1-4

Sample Identification

Number	Description
C823	GFF 110-787
C824	Front half acetone wash - 225 ml A/P
C828	Acetone blank - 225 ml A/P

Acetone Blank Background Data

Manufacturer: Anachemia Lot/Batch: 990413 Density: 0.7857 g/ml

C_a = Acetone blank residue concentration (mg/mg)
m_a = Mass of acetone residue after evaporation (mg)
V_a = Volume of acetone blank (ml)
ρ_a = Density of acetone (mg/ml)

$$C_a = m_a/(V_a\ \rho_a) = (\ 1.7\ )/(\ 225\ )(\ 0.0007857\ ) = 9.616 \text{ mg/mg}$$

Front Half Acetone Wash Data

W_a = Weight of acetone residue in wash (mg)
V_{aw} = Volume of acetone wash (ml)

$$W_a = C_a V_a \rho_a = (\ 9.616\ )(\ 225\ )(\ 0.0007857\ ) = 1.7 \text{ mg}$$

Acetone Wash Data

Beaker Number: 25/3

Gross Weight (g):	105.7224
Tare Weight (g):	105.7065
Blank Weight (g):	0.0017
Net Weight (g):	0.0142

Filter Data

Filter Number: 110-787

Gross Weight (g):	0.5789
Tare Weight (g):	0.5779
Net Weight (g):	0.0010

Particulate Weight Summary

Weight of particulate in front half wash (g):	0.0142
Weight of particulate on filter (g):	0.0010
Total weight of particulate catch (g):	0.0152

PARTICULATE LAB ANALYSIS
SUMMARY SHEET

Client: OMYA, Inc. Project Number: 001266 Test/Run: 1-5

Sample Identification

Number	Description
C825	GFF 110-788
C826	Front half acetone wash - 225 ml A/P
C828	Acetone blank - 225 ml A/P

Acetone Blank Background Data

Manufacturer: Anachemia Lot/Batch: 990413 Density: 0.7857 g/ml

C_a = Acetone blank residue concentration (mg/mg)
m_a = Mass of acetone residue after evaporation (mg)
V_a = Volume of acetone blank (ml)
ρ_a = Density of acetone (mg/ml)

$$C_a = m_a/(V_a\ \rho_a) = (\ 1.7\ )/(\ 225\ )(\ 0.0007857\ ) = 9.616 \text{ mg/mg}$$

Front Half Acetone Wash Data

W_a = Weight of acetone residue in wash (mg)
V_{aw} = Volume of acetone wash (ml)

$$W_a = C_a V_a \rho_a = (\ 9.616\ )(\ 225\ )(\ 0.0007857\ ) = 1.7 \text{ mg}$$

Acetone Wash Data

Beaker Number: 25/7

Gross Weight (g):	99.9758
Tare Weight (g):	99.9594
Blank Weight (g):	0.0017
Net Weight (g):	0.0147

Filter Data

Filter Number: 110-788

Gross Weight (g):	0.5807
Tare Weight (g):	0.5817
Net Weight (g):	-0.0010

Particulate Weight Summary

Weight of particulate in front half wash (g):	0.0147
Weight of particulate on filter (g):	-0.0010
Total weight of particulate catch (g):	0.0137

APPENDIX F

REQUIREMENTS FOR ASSIGNING A BASELINE COEFFICIENT VALUE OF 0.84 TO AN "S" TYPE PITOT TUBE

PITOT # 36-1 DATE 8/9/00 OBSERVATIONS BY (3)

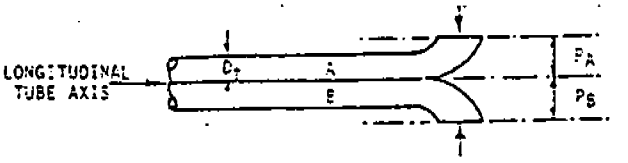
1.) All construction criteria for an isolated "S" type pitot are within given tolerances prescribed in Federal Register, Vol. 42, No. 160. Thursday, August 18, 1977.

REQUIRED MEASUREMENTS

a. External tubing diameter, D_t, 0.23 in. < D_t < 0.38 in.

b. Base to plane opening Distance, P_A and P_B, 0.40 in. < P_A=P_B < 0.60 in.

D_t= 0.375
P_A= 0.50
P_B= 0.50



2.) All assembly criteria to prevent aerodynamic interference for a sampling arrangement of an "S" type pitot, nozzle and thermocouple, are within given tolerances prescribed in Federal Register, Vol. 42, No. 160. Thursday, August 18, 1977.

REQUIRED MEASUREMENTS

a. External tubing diameter. See 1.a. above

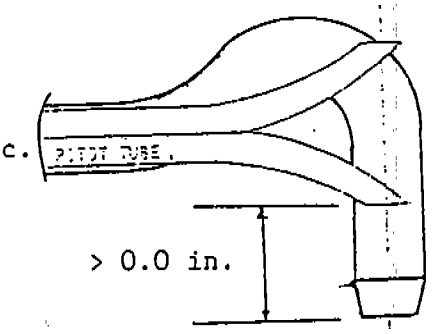
b. Pitot / nozzle separation, X, X ≥ 0.75 in. for nozzle diameter, D_n = 0.50 in.

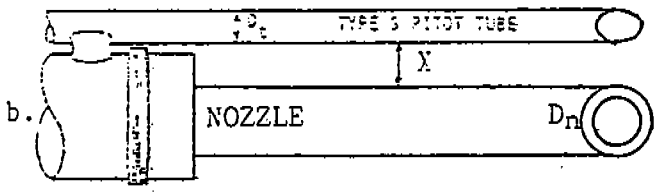
c. Plane of impact side of pitot in relation to plane of nozzle opening.

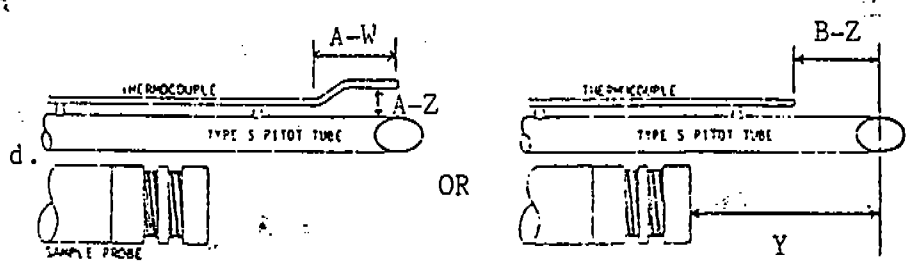
d. Thermocouple placement, Z, A-Z ≥ 0.75 in., A-W ≥ 3.0 in., B-Z ≥ 2.0 in.

e. Pitot / probe sheath distance, Y, Y ≥ 3.0 in.

D_n= 0.25
X = 0.75
Z = 1.00
Y = 3.5







Stack Temperature Sensor Calibration

Date: 01/12/2000

Barometric Pressure: 29.82

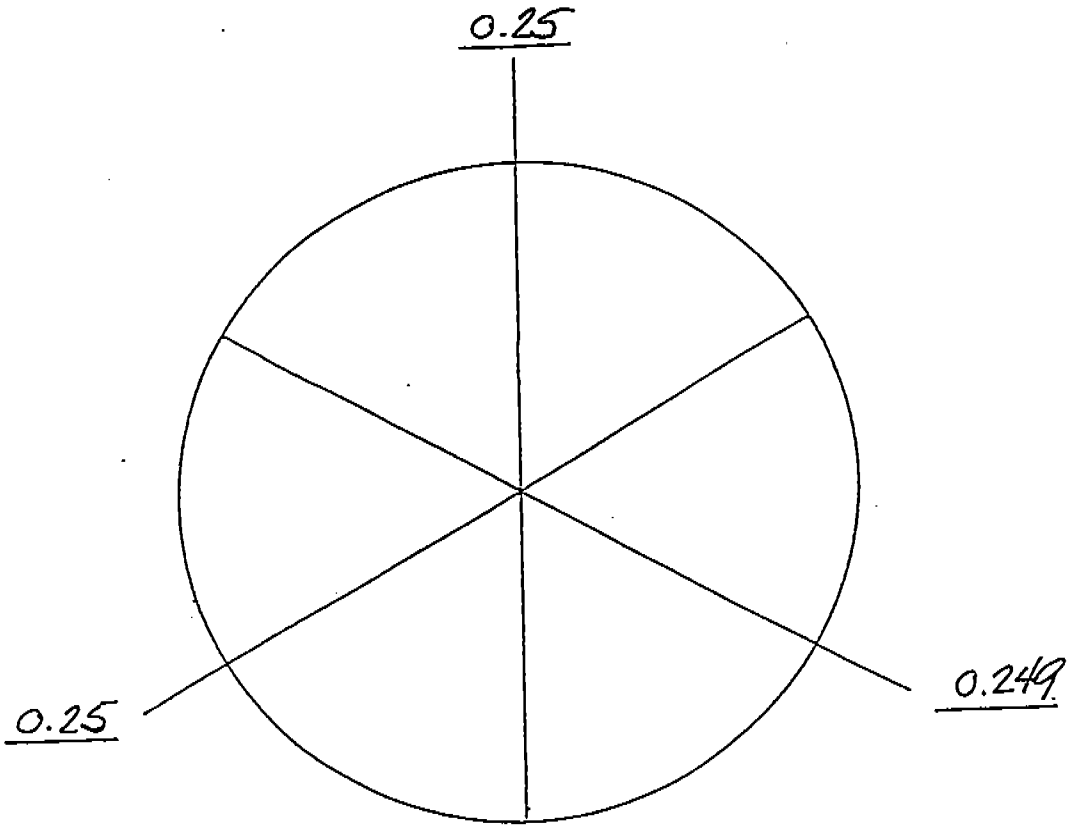
Ambient Temperature: 61°f

Calibrated by: John Jasko

Thermocouple Id # :	TC-36-1			
Reference Point	Source	Reference Thermometer Temperature (°F)	Thermocouple Potentiometer Temperature (°F)	Temperature Difference (%)
1	Ice Water	33	33	0.00
2	Warm Water	116	117	-0.17
3	Hot Oil	389	392	-0.35
4	Hot Oil	242	244	-0.28
Thermocouple Id # :	TC-36-2			
Reference Point	Source	Reference Thermometer Temperature (°F)	Thermocouple Potentiometer Temperature (°F)	Temperature Difference (%)
1	Ice Water	33	33	0.00
2	Warm Water	116	116	0.00
3	Hot Oil	391	389	0.24
4	Hot Oil	245	243	0.28

NOZZLE CALIBRATION DATA FORM

Date: 8/9/2000 Calibrated by: (A)



Nozzle Identification Number	Nozzle Diameter[a]			ΔD^b mm (in.)	$D_{avg}{}^c$
	D_1 mm (in.)	D_2 mm (in.)	D_3 mm (in.)		
B-4	0.250	0.250	0.249	0.001	0.250

Where:
a = nozzle diameters b = maximum difference c = average diameter

METER BOX CALIBRATION
(ANNUAL)

DATE: 04-Jan-00
CALIBRATED BY: John Jasko

METER BOX NUMBER: 1286-340
NEXT CAL DUE: 05-Jul-00

BAROMETRIC PRESSURE (In. Hg)	ORIFICE MANOMETER SETTING (In. H2O)	WET TEST METER VOLUME (cf)	DRY GAS METER VOLUME		TEMPERATURES				TIME (min)	Yi	DELTA H@
			INITIAL (cf)	FINAL (cf)	WET TEST METER (°F)	DRY GAS METER INLET (°F)	DRY GAS METER OUTLET (°F)	DRY GAS METER AVERAGE (°F)			
29.45	0.5	5	60.587	65.780	60.5	95 95	67 74	82.8	12.23	1.003	1.607
29.45	1.0	5	66.822	72.037	60.5	92 100	73 75	85.0	8.81	1.001	1.661
29.45	1.5	10	72.764	83.263	60.5	95 109	76 81	90.3	14.70	1.003	1.718
29.45	2.0	10	84.585	95.141	60.5	104 111	80 83	94.5	12.86	1.004	1.740
29.45	3.0	10	97.002	107.568	60.5	107 114	83 85	97.3	10.49	1.006	1.728
29.45	4.0	10	109.248	119.825	60.5	111 115	85 86	99.3	9.13	1.006	1.739
									AVERAGE	1.004	1.699

TOLERANCES FROM AVERAGE FOR Yi and DELTA H@ ARE <0.02 AND 0.20, RESPECTIVELY

Yi	Yi DIFF	DELTA H@	DELTA H@ DIFF
1.003	-0.001	1.607	-0.092
1.001	-0.003	1.661	-0.038
1.003	-0.001	1.718	0.019
1.004	0.000	1.740	0.041
1.006	0.002	1.728	0.029
1.006	0.002	1.739	0.040

METER BOX CALIBRATION
(POST-TEST)

PROJECT: 001266
DATE: 25-Oct-00
CALIBRATED BY: Roland Tremble

METER BOX NUMBER: 1286-340
PRETEST CAL Y: 1.004

BAROMETRIC PRESSURE (In. Hg)	ORIFICE MANOMETER SETTING (In. H2O)	MAXIMUM VACUUM (In. H2O)	WET TEST METER VOLUME (cf)	DRY GAS METER VOLUME		TEMPERATURES				TIME (min)	Yi
				INITIAL (cf)	FINAL (cf)	WET TEST METER (°F)	DRY GAS METER INLET (°F)	DRY GAS METER OUTLET (°F)	DRY GAS METER AVERAGE (°F)		
30.06	2.20	4.0	10	306.253	316.512	59.5	79 96	65 70	77.5	12.17	1.003
30.06	2.20	4.0	10	316.512	326.881	59.5	90 98	72 75	83.8	12.13	1.004
30.06	2.20	4.0	10	326.881	337.301	59.5	90 99	75 77	85.3	12.20	1.002
										AVERAGE	1.003

ACCEPTABLE VARIATION IN CALIBRATION
(Must be less than 5% of Pretest Meter Calibration)

Difference from Pretest Calibration = -0.1 % >>>> ACCEPTABLE